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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/196,185	11/20/1998	MYUNG-KOO HUR	6192.0052.AA	8847

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EXAMINER

QI, ZHI QIANG

ART UNIT	PAPER NUMBER
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2871

DATE MAILED: 06/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/196,185

Applicant(s)

HUR ET AL.

Examiner

Mike Qi

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,6-14 and 18-26 is/are pending in the application.
- 4a) Of the above claim(s) 1-3,6-13 and 18-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14 and 21-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 14, 21-24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,852,481 (Hwang) in view of US 5,162,933 (Kakuda et al) and JP 05241173 (Yatabe et al).

Claims 14, 23-24 and 26, Hwang discloses (col.1, line 36 – col.2, line 5; Figs.1A-1D) that a conventional thin film transistor (TFT) panel comprising:

- an insulating substrate (glass substrate 10);
- gate electrode layer (11, 12) formed on the substrate (10) which is connected with gate line, gate electrode and gate pad, so as to constitute gate wire on the substrate (10) having gate line, gate electrode and gate pad;
- a gate insulating layer (15) covering the gate wire (11,12);
- a semiconductor layer (17) formed on the gate insulating layer (15);
- source/drain electrodes (19) formed on the semiconductor layer (17) which is connected with data line and data pad, so as to constitute data wire on the semiconductor layer (17) having data line, data electrode and data pad;

- a passivation layer (21) formed on the data wire and the gate wire, and having one contact hole extended to the gate pad (12) and another contact hole extended to the drain electrode (19);
- a transparent conductive layer (indium tin oxide, ITO, forming pixel electrode 22) formed on the passivation layer (21), and connected to the gate pad (12) and the data wire (source/drain electrodes) through contact holes.

Hwang does not explicitly disclose that the gate wire and the data wire comprise a main layer and a supplemental layer and the material for the two-layer structure of the gate wire and data wire (the main layer and the supplemental layer), such that the main layer comprises metal or metal alloy and the supplemental layer comprises metal nitride or metal alloy nitride being inert to an etchant for preventing the gate pad or the data wire from being eroded by the etchant.

However, Hwang discloses (col.4, line 14 – col.5, 30; Fig.2) that forming laminated gate electrode (111,112,113), and such that would simplify the fabricating method. The gate wire and the data wire comprise a main layer and a supplemental layer would be the same principle.

However, Kakuda discloses (col.10, line 30 – col.11, line 55; Fig.8) that the gate line (13) and the data line (11), both of them, are formed by laminating metal layers (13a, 13b; 11a, 11b) such as MoCr_x and aluminum layers (two-layer structure, and the MoCr_x having function of supplemental layer and the aluminum having function of main layer comprising metal), and that is the gate wire and the data wire comprise a main layer and a supplemental layer, and such laminated metal layers prevents the

generation of hillock and its surface remained smooth, and the thin film transistors formed on such a layer remarkably decreasing the number of shorts, and reducing the sheet resistance so as to obtain high-speed of the data line by employ such laminated wiring structure.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to employ two-layer structure for decreasing shorts of the TFT and obtain high speed of the data line and prevent the generation of hillock and remaining the surface smooth.

Still lacking limitation is such that the supplemental layer comprises metal nitride or metal alloy nitride and being inert to an etchant for preventing the gate pad or the data wire from being eroded by the etchant.

However, Yatabe discloses (abstract) that the material of the electrode for liquid crystal display comprising metal nitride that is a solvent-resistant layer or air permeation resistant layer. Therefore, the metal nitride has such property to resist the solvent effect and air permeation effect, such that the metal nitride has a property being inert to an etchant. Yatabe also indicates (abstract) that using such metal nitride to obtain electrode (any electrode) enables high quality display.

The ordinary skilled in the art would be based on the inert property of the metal nitride to design such two-layer structure, according to the teaching such as Kakuda using a two-layer structure for the gate wire and data wire and modifying the material such as Yatabe teaches the metal nitride having the property of solvent resist effect and air permeation resist effect so as to obtain a substantially inert to an etchant used for

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etching the transparent layer for preventing the gate pad and data wire from being eroded by the etchant. (Reference listed below also showing the property of the metal nitride material).

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to arrange the gate wire or data wire using two-layer structure (metal as main layer, and metal nitride as supplementary layer) as claimed in claims 14, 23-24 and 26 for achieving inert etching such as solvent-resistant/air permeation-resistant effect and a high quality display.

Claims 21-22, Hwang discloses (col.1, line 36 – col.5, line 15; Fig.1) that a transparent conductive layer (indium tin oxide, ITO, forming pixel electrode 22) formed on the passivation layer (21), and connected to the drain electrode (19) through a contact hole; and also using such ITO (gate ITO) connected to the gate pad (12) through another contact hole.

3. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hwang, Kakuda and Yatabe as applied to claims 14, 21-24 and 26 above, and further in view of US 4,141,022 (Sigg et al).

Claim 25, lacking limitation is such that the material of the supplementary layer comprises tungsten or chromium or zirconium or nickel.

However, Sigg discloses (col.1, line 62 – col.2, line 3) that the material of chromium over a metal layer is an etching resistant metal layer so as to protect the metal structure from being etched by the chemical etchant. Therefore, the material of

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chromium as the supplementary layer has the property of etch resistant to protect the wire under the chromium from being etched by the chemical etchant.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to employ a supplementary layer comprises such as chromium as claimed in claim 25 for protecting metal wire from being etched by the chemical etchant.

Response to Arguments

4. Applicant's arguments filed on Mar.31, 2005 have been fully considered but they are not persuasive.

(1) The reference Hwang discloses a principle to form a laminated electrode such as the gate electrode (111, 112, 113 of Fig.2), and the reference Hwang is relied on the basic LCD structure, and a transparent conductive layer (ITO) formed on the passivation layer and connected to the gate pad.

(2) The reference Kakuda is relied on the gate wire (13a13b of Fig.8) and the data wire (11a,11b of Fig.8) having two layers laminated structure, and that is the gate wire and the data wire comprise a main layer and a supplemental layer), and the combination of the prior art that using laminated structure for the gate wire and the data wire would have been obvious. Some references such as US 6,107,668 (Ukita) also discloses such laminated wire technique in which (col.4, lines 51-57) the tungsten nitride film (metal nitride) is highly resistive to the chemicals and suppresses the metal from the corrosion of the electrode by the etchant. Therefore, the material of metal nitride such as tungsten nitride has such property being inert to an etchant and

preventing the wires such as gate pad or data wire under the metal nitride material, and that would have been obvious.

(3) The reference Yatabe is relied on the material of the electrode for liquid crystal display comprising metal nitride that is a solvent-resistant layer or air permeation resistant layer. Therefore, the metal nitride has such property to resist the solvent effect and air permeation effect, such that the metal nitride has a property being inert to an etchant. Yatabe also indicates (abstract) that using such metal nitride to obtain electrode (any electrode) enables high quality display. The purpose of this invention is to provide a data wire highly endurable against a chemical reactive etchant using the metal nitride as a supplementary layer, and that would have been obvious according the prior art of record.

(4) The reference Sigg is relied on using chromium as the supplementary layer.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mike Qi whose telephone number is (571) 272-2299. The examiner can normally be reached on M-T 8:00 am-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mike Qi

Mike Qi
Patent Examiner
May 26, 2005